

What Is Claimed Is:

1. A method of assembling an exhaust gas recirculation valve, comprising the steps of providing a base having a fluid conduit extending between first and second ports, a valve member disposed within the fluid conduit, and a valve shaft having a first end fixed to the valve member and a second end; and mounting a linear actuator with rotary motor to the base, the actuator including a displaceable member having an end that is decoupled from the valve shaft and wherein the member's end is engaged with the valve shaft when the valve is configured in an open position.
2. The method of claim 1, wherein the mounting step includes disposing the member's end and valve shaft in a spaced relationship.
3. The method of claim 1, further including the step of providing a spring having a second end engaged with a portion of the valve shaft and a first end that is disposed between the valve shaft first end and the valve shaft portion.
4. The method of claim 3, wherein the portion includes a first flange and the spring second end is engaged with the first flange.
5. The method of claim 4, further including the step of providing a passageway within the base and receiving the valve shaft within the passageway, the passageway having a first opening facing the actuator and a second opening facing the valve member, locating a bearing within the passageway, positioning a second flange at the first opening, and engaging the first end of the spring with the second flange.

6. The method of claim 5, wherein the mounting step includes the step of positioning an end of the displaceable member in proximity of the second end of the valve shaft so that the member's end is brought in contact with the shaft second end.
7. The method of claim 6, wherein the providing step further includes forming a curved surface at the shaft second end.
8. The method of claim 7, further including the step of disposing a disc-shaped member at the end of the displaceable member.
9. A method for operating an EGR valve, comprising the steps of:
 - providing a valve portion including a valve member engaged with a valve seat when the valve portion is in a closed position, a valve stem having a longitudinal axis, a first end secured to the valve member and a second end, and a spring that biases the valve member into engagement with the valve seat;
 - providing a linear actuator including a rotary motor and a displaceable member coupled to the motor's rotor, wherein the rotation axis of the rotor is substantially parallel to the longitudinal axis; and
 - opening the valve including pushing the displaceable member into the valve stem second end.
10. The method of claim 9, wherein the rotation axis is approximately parallel to the longitudinal axis.
11. The method of claim 9, wherein the pushing step includes pushing a disc-shaped member disposed at the end of the displaceable member into a curved shaped surface formed at the valve stem second end.
12. The method of claim 9, wherein the spring is a linear spring.

13. The method of claim 12, further including the step of disposing the spring between the valve member and the actuator.
14. The method of claim 13, further including the step of providing a flange at the valve stem second end engaging a first end of the spring with the flange and a second end with the base at a location disposed between the flange and the valve member.
15. A method of closing an EGR valve, comprising the steps of:
 - providing a linear actuator having a rotary motor;
 - providing a base, a valve member disposed within the base and being engaged with a valve seat when the valve is closed and the valve member being linearly displaced from the valve seat when configured from a closed to an open position;
 - providing a spring disposed below the actuator wherein the spring is compressed when the valve is open; and
 - upon power loss to the motor, closing the valve including expanding the compressed spring.
16. The method of claim 15, wherein the providing a linear actuator step includes providing a motor having a constant rotor rate.
17. The method of claim 16, wherein the motor is a synchronous motor.
18. The method of claim 17, wherein the providing step includes providing a valve stem coupled to the valve member and having a longitudinal axis, and the rotor axis of rotation is substantially parallel to a longitudinal axis.
19. The method of claim 18, wherein the spring is a linear spring.

20. The method of claim 19, further including the step of disposing the spring between the valve member and the actuator.
21. The method of claim 20, further including the step of providing a flange at a valve stem second end, the flange engaging a first end of the spring and a second end of the spring engages the base at a location disposed between the flange and the valve member.
22. A method of operating an EGR valve, including the steps of:
providing a linear actuator including a rotary motor having a rotor and shaft that is linearly displaced as the rotor rotates;
opening the valve, including the steps of extending the shaft, displacing a valve member from a valve seat, and compressing a linear spring; and
upon power loss to the motor, closing the valve including retracting the shaft using the energy stored in the compressed linear spring.
23. The method of claim 22, wherein the providing a linear actuator step includes providing a synchronous motor.
24. The method of claim 23, further including the step of disposing the spring between the valve member and the actuator.
25. The method of claim 24, further including the step of providing a valve stem coupled to the valve member at one end, and the shaft at the other end.
26. The method of claim 25, further including the step of providing a flange at the valve stem second end, engaging a first end of the spring with the flange and a second end with the base at a location disposed between the flange and the valve member.